

GAO

Report to the Honorable Duncan L.
Hunter, House of Representatives

June 1999

TECHNOLOGY TRANSFER

Number and Characteristics of Inventions Licensed by Six Federal Agencies



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Resources, Community, and
Economic Development Division

B-281432

June 18, 1999

The Honorable Duncan L. Hunter
House of Representatives

Dear Mr. Hunter:

The federal government, a major sponsor of research and development, provided about \$70 billion in funding for this purpose in fiscal year 1998. Federal funds are used to support both "intramural" programs that involve government employees working in government facilities and "extramural" programs that are carried out by nonfederal organizations through contracts and grants.¹ In some cases, federally sponsored research leads to the creation of new products and processes that can be patented and commercialized. Generally, when a federal employee creates an invention within the scope of his or her employment, the applicable agency retains title, may license the invention to third parties, and may receive royalties under the license. When a contractor or grantee creates the invention, however, the contractor or grantee generally is allowed to take title to, license, and receive royalties on the invention.

You requested that we provide statistical information on the licensing of government-owned inventions created under federally funded research projects. This report provides information on (1) government-owned inventions licensed by six federal agencies during fiscal years 1996 through 1998, including the royalties received during that period, and the total number of active licenses these agencies had as of October 1, 1998; (2) whether the licenses were exclusive or nonexclusive; (3) whether the licensees were small businesses, individuals, large businesses, or nonprofit organizations; and (4) whether the licensees were foreign or domestic.

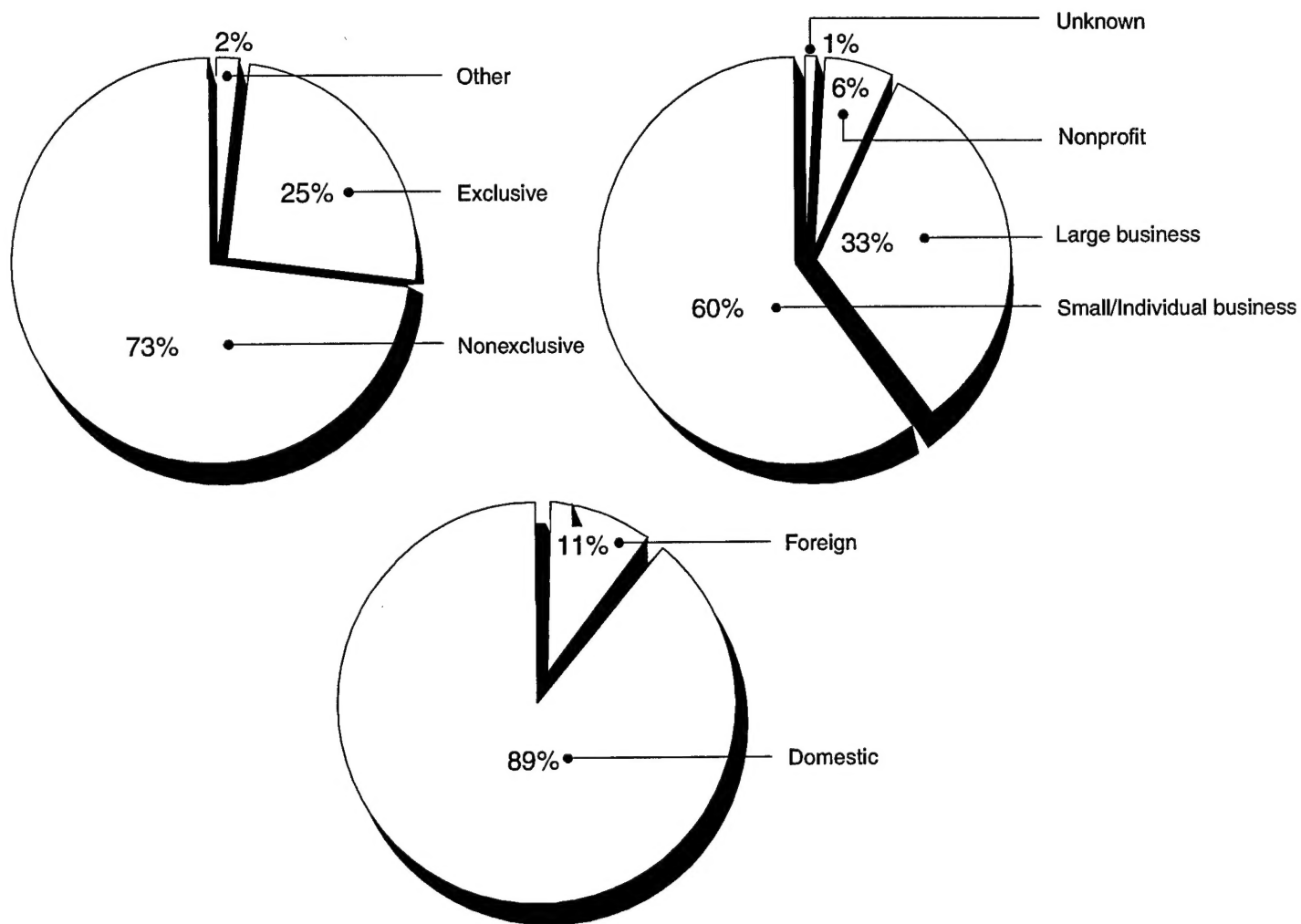
Generally, an "exclusive license" conveys the right to make, use, or sell the invention to only one licensee, while a "nonexclusive license" can convey all or a portion of these rights to multiple licensees. A "small business" is a for-profit entity with 500 or fewer employees; a "large business" is a for-profit entity with more than 500 employees; and a "nonprofit" is any other organization. A "domestic" licensee is one incorporated or headquartered in the United States, while all other licensees are considered "foreign." The six agencies are the National Institutes of Health, within the Department of Health and Human Services;

¹Some agencies, such as the Department of Energy, use contractors to operate federally owned facilities. This report concerns only government-owned inventions and thus does not include any statistics for contractor-owned inventions created in federally owned laboratories.

the departments of the Army, the Navy, and the Air Force; the Department of Energy; and the National Aeronautics and Space Administration.

Results in Brief

The six agencies reported that they granted a total of 866 licenses and received \$107.5 million in royalties during fiscal years 1996 through 1998. As shown in figure 1, most of the licenses were nonexclusive, most went to small businesses or individuals, and most went to domestic entities.

Figure 1: Characteristics of Licenses and Licensees

Source: GAO's presentation of data from the National Institutes of Health (NIH); the departments of the Army, the Navy, and the Air Force (USAF); the Department of Energy (DOE); and the National Aeronautics and Space Administration (NASA).

As of October 1, 1998, the six agencies had a total of 1,391 active licenses. The license types, licensee types, and licensee locations occurred in

proportions similar to those licenses granted during fiscal years 1996 through 1998.

Background

For multiple and diverse reasons, the U.S. government encourages the licensing and commercialization of inventions created under federally sponsored research. These reasons include assisting small businesses, promoting collaboration between commercial enterprises and nonprofit organizations, and encouraging the use of new technology by U.S. industry and labor. Under 35 U.S.C. 207, federal agencies are authorized to apply for patents and to grant licenses for federally owned patent applications and patents.

There is no comprehensive national database on the licensing of federally funded inventions. Recording licenses to third parties is permitted at the Patent and Trademark Office, within the Department of Commerce, but is not required for either the public or government patent holders. When licenses are submitted for recording, they are included in an "assignment" database that primarily provides a record of patent ownership. However, according to Patent and Trademark Office officials, few licenses are recorded at their office for inclusion in this database. The Government Register, established by executive order in 1944, is a subset of the assignment database and is the official record of all rights and interests of the U.S. government in and under patents. The Government Register is not used to record licenses to third parties.

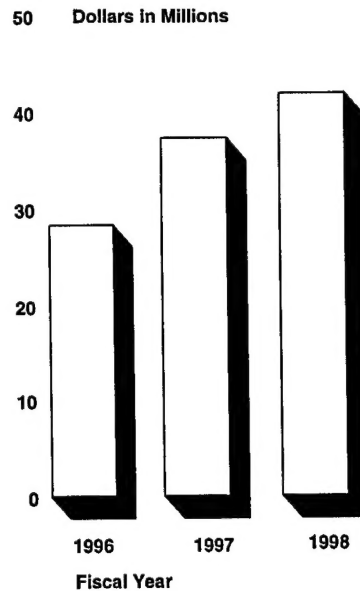
Data concerning agency licensing is also published by the Department of Commerce as part of its biennial reporting of agencies' implementation of the Stevenson-Wydler Technology Innovation Act and related legislation.²

Annual Licenses Granted Have Remained Constant, but Royalties Have Increased

The number of new licenses granted annually by the six federal agencies remained relatively constant for the 3 fiscal years, with 279 in fiscal year 1996, 292 in fiscal year 1997, and 295 in fiscal year 1998. As shown in figure 2, royalty revenues increased from \$28.3 million in fiscal year 1996 to \$41.9 million in fiscal year 1998, an increase of 48.1 percent (see app. I).

²Under the Stevenson-Wydler Technology Innovation Act of 1980, as amended, it is the policy of the federal government, where appropriate, to transfer federally owned or originated technology to state and local governments and to the private sector (15 U.S.C. 3710(a)). As part of its responsibility under this act, the Secretary of Commerce is required to submit biennial reports to the President and the Congress on agencies' use of the act's authorities (15 U.S.C. 3710(g)(2)).

Figure 2: Royalties Received by Six Federal Agencies, Fiscal Years 1996 Through 1998

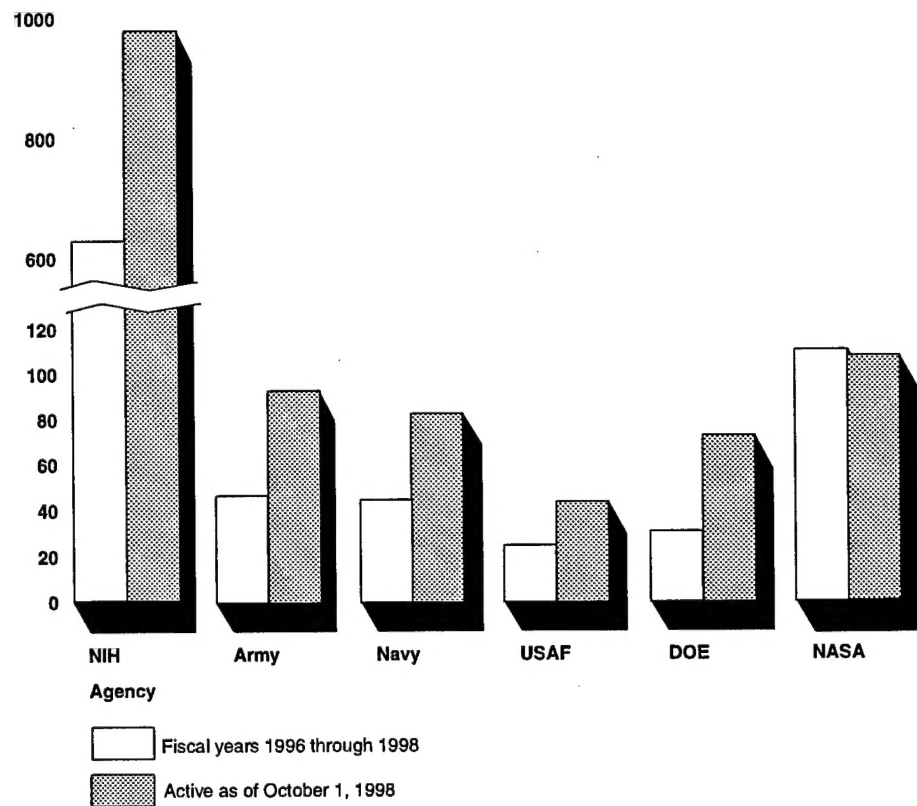


Source: GAO's presentation of data from NIH, the Army, the Navy, the USAF, DOE, and NASA.

As shown in figure 3, NIH was by far the largest licensor among the six agencies, accounting for 607, or 70.1 percent, of the total licenses granted over the 3 fiscal years. NIH also had the majority of active licenses, with 990, or 71.1 percent, of the 1,391 licenses active as of October 1, 1998.

Figure 3: Licenses Granted by Six Federal Agencies, Fiscal Years 1996 Through 1998 and Active as of October 1, 1998

1200 Number of licenses



Source: GAO's presentation of data from the agencies cited.

As shown in table 1, NIH also had the largest share of total royalty payments received during fiscal years 1996 through 1998, accounting for \$102.2 million, or 95.1 percent, of the \$107.5 million received by the six agencies.

Table 1: Royalties Received by Six Federal Agencies, Fiscal Years 1996 Through 1998

Agency	Royalties received	Percentage of total royalties
NIH	\$102,200,000	95.1
The Army	1,030,537	1.0
The Navy	1,765,006	1.6
The USAF	560,000	0.5
DOE	435,175	0.4
NASA	1,470,280	1.4
Total	\$107,460,998	100

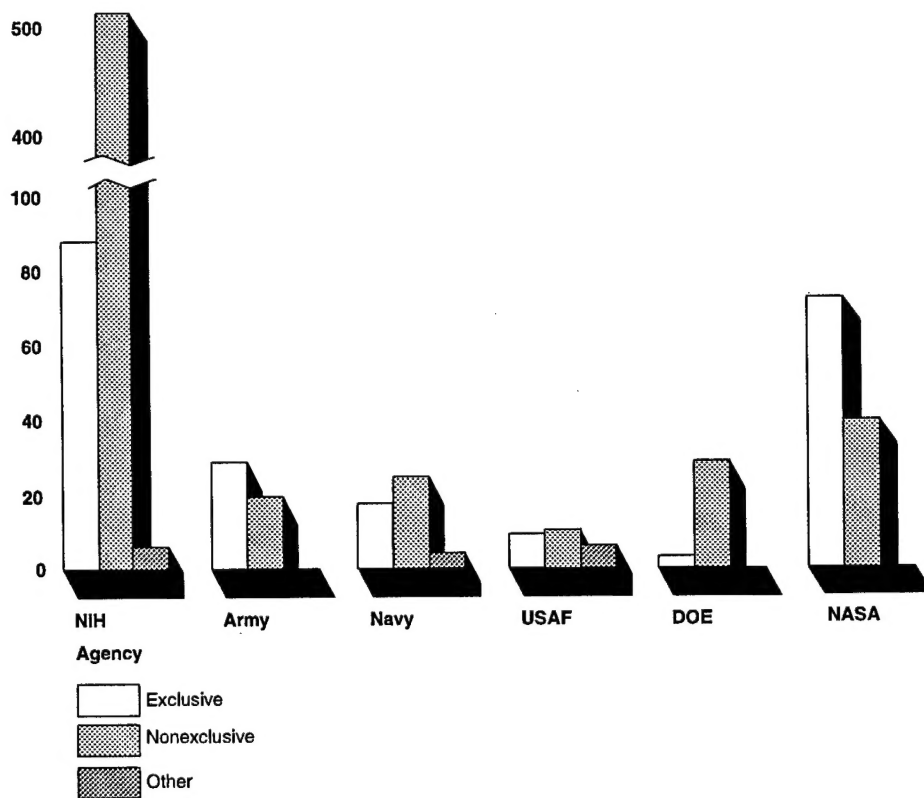
Source: GAO's presentation of data from the agencies cited.

Most Licenses Were Nonexclusive

Most of the licenses reported by the six agencies were nonexclusive. Nonexclusive licenses accounted for 634, or 73.2 percent, of the licenses granted during fiscal years 1996 through 1998 and for 963, or 69.2 percent, of the licenses active as of October 1, 1998. As shown in figures 4 and 5, the individual agencies varied widely by the type of license granted. NIH reported that 514, or 84.7 percent, of its licenses granted during the 3 fiscal years and 769, or 77.7 percent, of its active licenses were nonexclusive. NIH granted more licenses than the other five agencies combined, and because of the amounts for NIH, the percentage of nonexclusive licenses for these five agencies was much smaller than for all six agencies combined. While DOE also had a high proportion of nonexclusive licenses, the other four agencies had far smaller proportions and, in some cases, had more exclusive than nonexclusive licenses (see apps. III and IV).

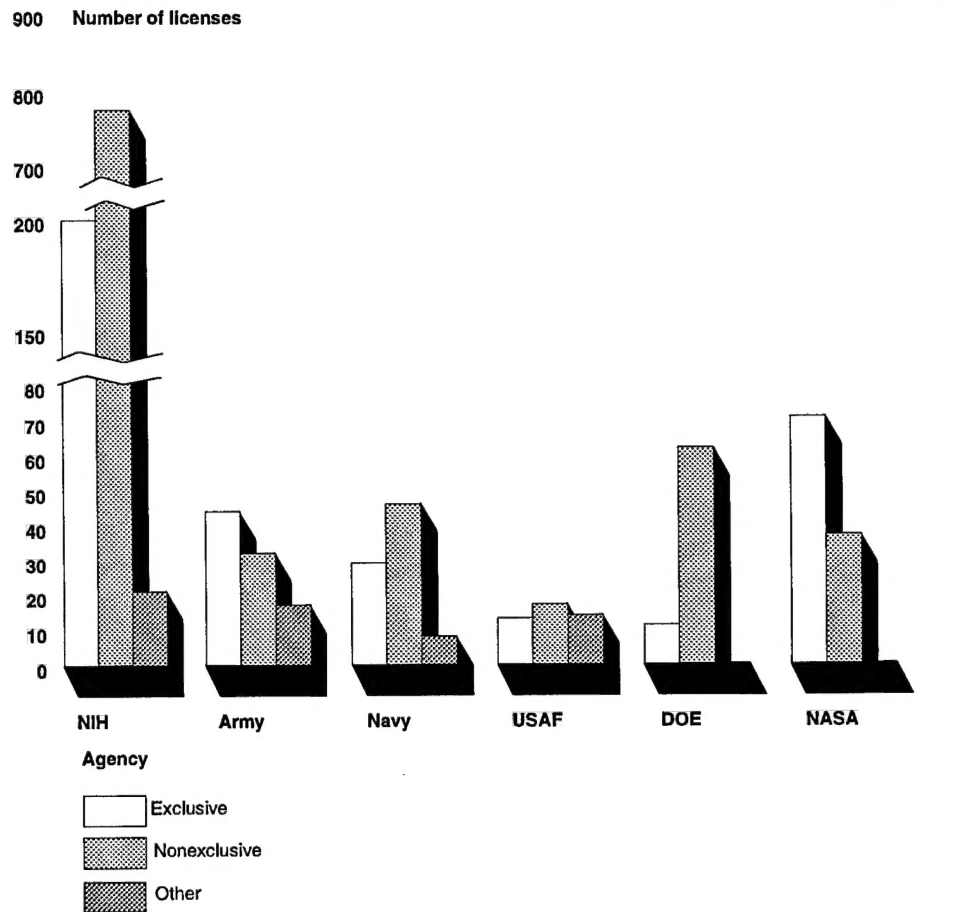
Figure 4: Types of Licenses Granted by Six Federal Agencies, Fiscal Years 1996 Through 1998

600 Number of licenses



Source: GAO's presentation of data from the agencies cited.

Figure 5: Types of Licenses Granted by Six Federal Agencies, Active as of October 1, 1998



Source: GAO's presentation of data from the agencies cited.

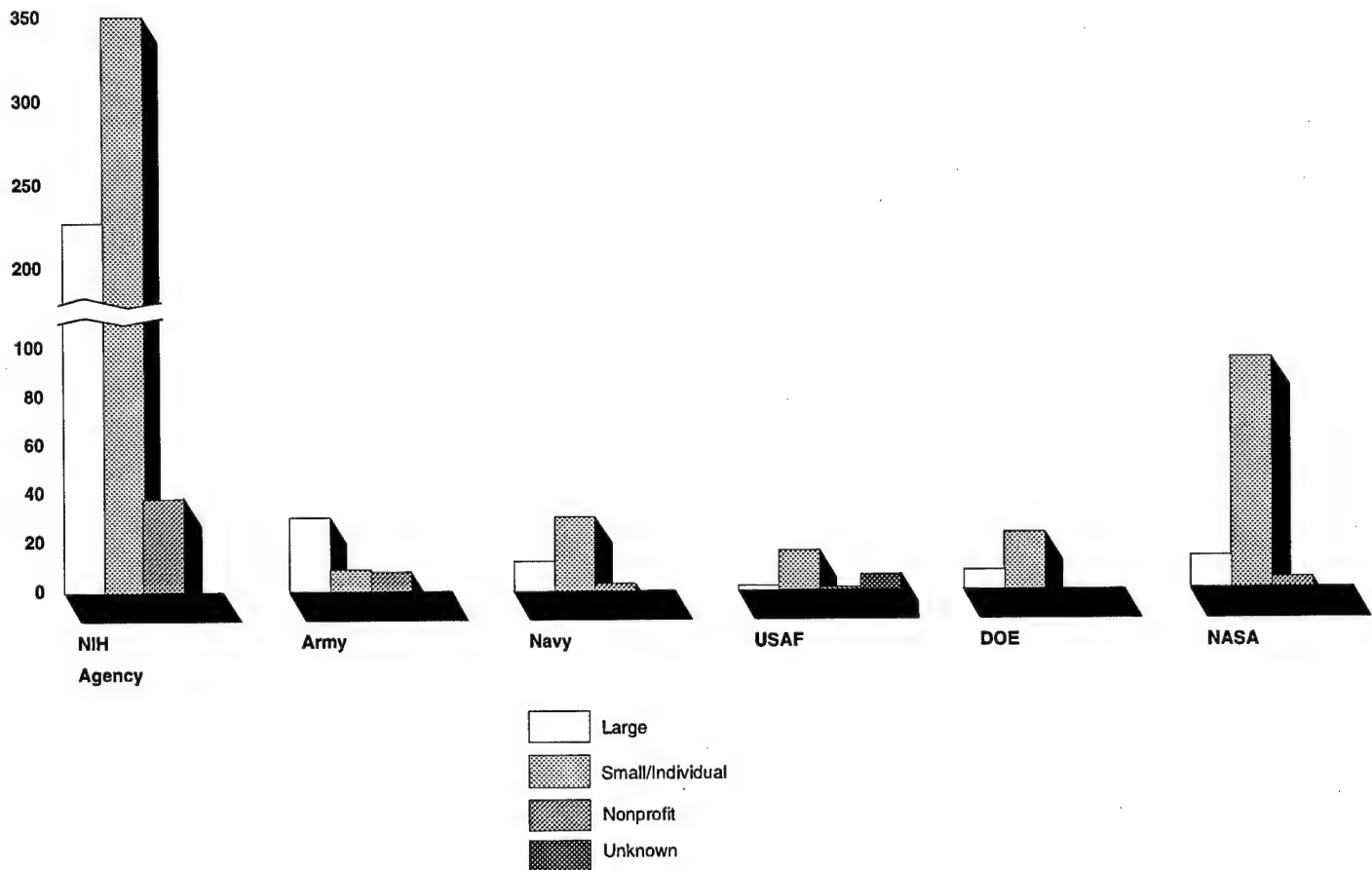
Most Licensees Were Small Businesses and Individuals

Small businesses and individuals represented the largest segment of licensees for government-owned inventions. Small businesses and individuals accounted for 518, or 59.8 percent, of all licenses granted during fiscal years 1996 through 1998 and for 744, or 53.5 percent, of the licenses active as of October 1, 1998. Large businesses accounted for more than a third of licenses granted over the 3-year period as well as for active licenses. Nonprofit organizations accounted for only 54, or 6.2 percent, of the licenses granted during the 3 fiscal years and 40, or 2.9 percent, of the active licenses.

As shown in figures 6 and 7, the individual agencies were consistent in granting a majority of their licenses to small businesses and individuals. The only exception was the Army, which reported that small businesses and individuals accounted for 9, or 19.1 percent, of the licenses it granted in fiscal years 1996 through 1998 and for 20, or 21.5 percent, of active licenses (see apps. V and VI).

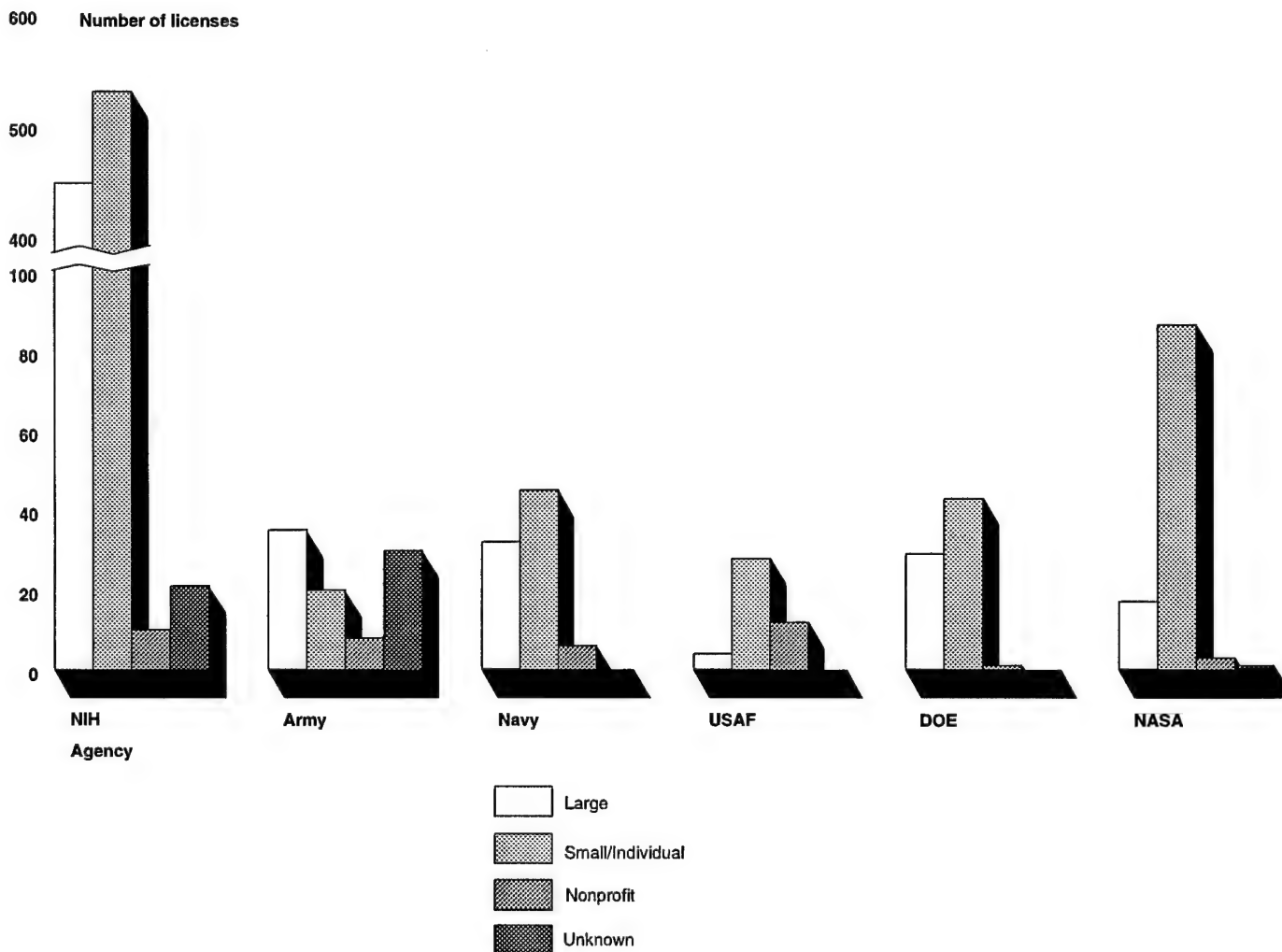
Figure 6: Licenses Granted by Six Federal Agencies, by Licensee Type and Agency, Fiscal Years 1996 Through 1998

400 Number of licenses



Source: GAO's presentation of data from the agencies cited.

Figure 7: Licenses by Licensee Type and Agency, Active as of October 1, 1998



Source: GAO's presentation of data from the agencies cited.

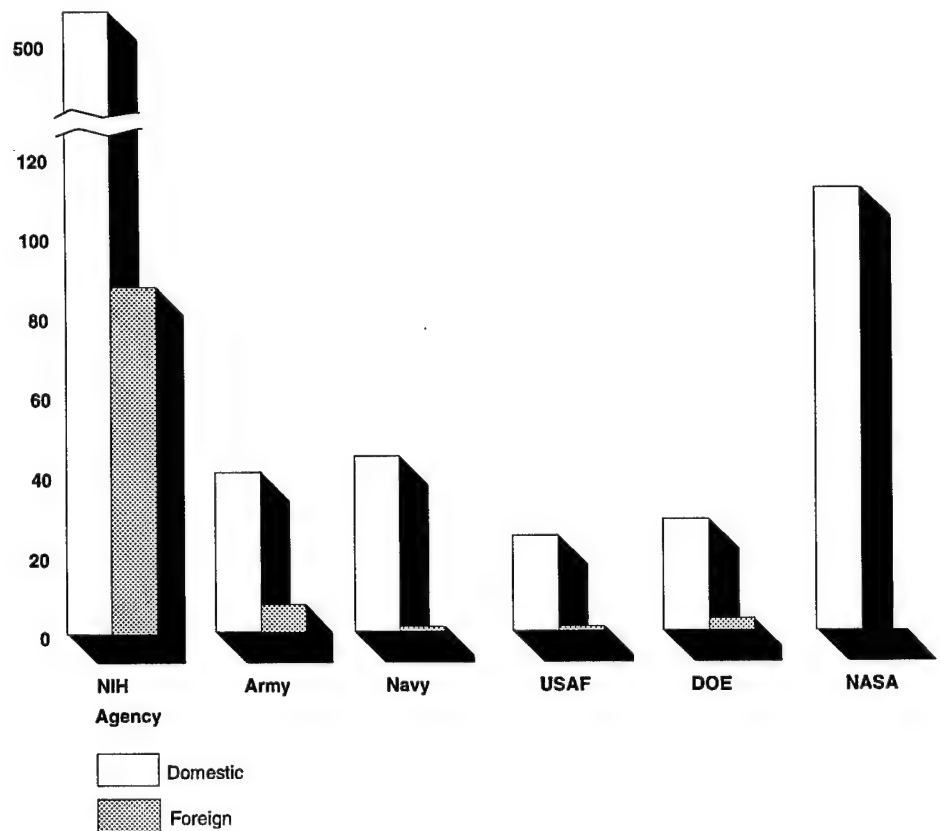
Most Licensees Were Located in the United States

The majority of licenses went to domestic entities. Of the licenses granted in fiscal years 1996 through 1998, 767, or 88.6 percent, went to domestic entities, as did 1,177 or 84.6 percent of the licenses active as of October 1, 1998. Figures 8 and 9 show that the individual agencies generally were consistent in granting a majority of their licenses to domestic entities, with

all six agencies reporting at least 80 percent of their licenses as domestic. Most of the licenses that went to foreign entities had been granted by NIH (see apps. VII and VIII).

Figure 8: Licenses Granted by Licensee's Location and Agency, Fiscal Years 1996 Through 1998

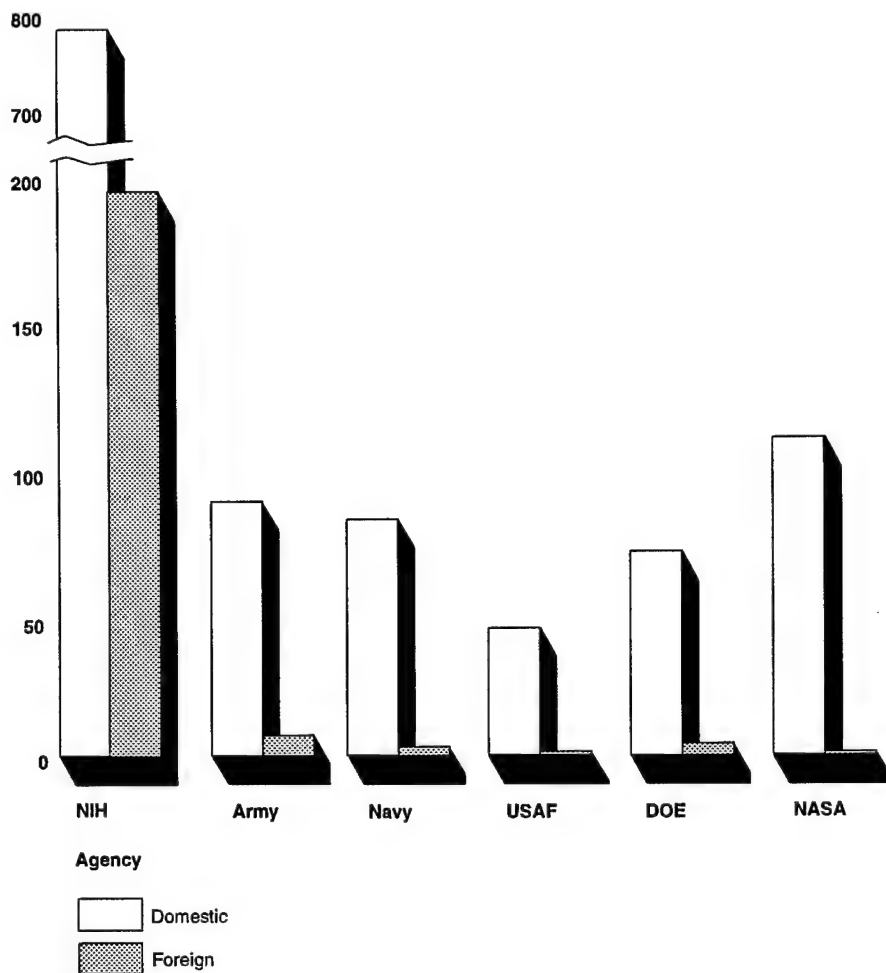
600 Number of licenses



Source: GAO's presentation of data from the agencies cited.

Figure 9: Licenses by Licensee's Location and Agency, Active as of October 1, 1998

900 Number of licenses



Source: GAO's presentation of data from the agencies cited.

Agency Comments and Our Evaluation

We provided copies of a draft of this report to the National Aeronautics and Space Administration, the Department of Commerce, the Department of Energy, the Department of Defense, and the National Institutes of Health for review and comment. The National Aeronautics and Space Administration responded that it had no comments. Each of the other

agencies recommended various changes and clarifications to the report, and we made changes as appropriate.

The Department of Commerce suggested that we acknowledge, in our introduction, that there are government-owned facilities operated by contractors where the inventions are not government-owned, and, consequently, statistics on these inventions are not included in our report. We revised the report in response. Commerce also suggested that we explain that some of the agencies are parts of departments where there are also other agencies conducting research and that our report does not provide statistics on these other agencies. While we agree that these other agencies conduct research, we did not make changes in this regard because the report already explains that the statistics included were limited to the six specific agencies named and that the six agencies are among the largest in terms of research funding and patents. In addition, Commerce suggested that we add information to the background section of the report to provide a better characterization of certain databases maintained by the Patent and Trademark Office and to note that Commerce provides a biennial report on agency licensing. We added these clarifications.

The Department of Defense, commenting for the departments of the Army, the Navy, and the Air Force, suggested a number of changes, such as adding footnotes to some of the data in the appendixes and making some revisions to license categories. We made each of these as appropriate to the statistics presented in appendixes in XI through XVI.

The Department of Energy requested that we include a statement in the report to show that the Department receives much of its royalty income from inventions created in its laboratories by contractors, even though the inventions themselves are not government-owned. We added this information as a note to the statistics presented in appendixes XVII and XVIII.

The National Institutes of Health suggested that we restate our definition of "nonexclusive" licenses to note that these licenses can convey the same rights as "exclusive" licenses but to multiple licensees. We changed the definition as suggested.

Scope and Methodology

Because there is no comprehensive database on the licensing of government inventions, we obtained our statistics directly from selected

funding agencies. We asked for information from six agencies—the National Institutes of Health; the departments of the Army, the Navy, and the Air Force; the Department of Energy; and the National Aeronautics and Space Administration. We chose these six agencies because they were among the largest agencies in terms of funding for research and development during fiscal year 1998, accounting for about \$54 billion, or 77.4 percent, of the \$69.8 billion in funding for all federal agencies. Also, they were the six largest agencies in terms of patents granted by the Patent and Trademark Office to federal agencies during fiscal years 1988 through 1997 and, according to federal officials knowledgeable with technology transfer, among the largest in invention-licensing activities.

From each agency selected, we requested information for licenses granted during fiscal years 1996 through 1998 as well as for licenses in effect as of October 1, 1998. We asked the agencies to provide statistics regarding (1) license type, or whether the licenses were exclusive or nonexclusive; (2) licensee type, or whether the inventions were licensed to individuals/small businesses, large businesses, or nonprofit organizations; and (3) licensee location, or whether the licensees were foreign or domestic.

We asked the agencies to provide information for both government-owned inventions and federally supported inventions owned by federal contractors and grantees. However, the agencies generally did not collect or maintain information on licenses granted to third parties by contractors and grantees. Thus, the licensing statistics in this report are limited to government-owned inventions.

We did not validate or verify the data provided by the agencies. However, we contacted agency officials to discuss their programs and to obtain answers to any questions we had regarding the statistics they had provided. We conducted our work from September 1998 through May 1999 in accordance with generally accepted government auditing standards.

We will send copies of this report to the appropriate House and Senate committees; interested Members of Congress; the agencies discussed in this report; the Honorable Jacob J. Lew, Director, Office of Management and Budget; and other interested parties. We will make copies available to

others upon request. If you or your staff have any questions or need additional information, please call me at (202) 512-3841. Major contributors to this report are listed in appendix XXI.

Sincerely yours,

A handwritten signature in cursive script, reading "Susan Kladiva".

Susan Kladiva
Associate Director, Energy,
Resources, and Science Issues

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Abbreviations

DOE	Department of Energy
GAO	General Accounting Office
NASA	National Aeronautics and Space Administration
NIH	National Institutes of Health
USAF	United States Air Force

Characteristics of the Licenses Granted and the Royalties Received by Six Federal Agencies, Fiscal Years 1996 Through 1998

Description	Fiscal year			Total
	1996	1997	1998	
Total licenses granted	279	292	295	866
License type				
Exclusive	81	70	65	216
Nonexclusive	188	218	228	634
Other ^a	10	4	2	16
Licensee type				
Large business	100	92	96	288
Small business/individual	153	185	180	518
Nonprofit	20	15	19	54
Unknown	6	0	0	6
Licensees' location				
Domestic	243	262	262	767
Foreign	36	30	33	99
Total royalties received	\$28,323,050	\$37,270,104	\$41,867,844	\$107,460,998

Note: The federal agencies are the National Institutes of Health (NIH) within the Department of Health and Human Services, the Department of the Army (Army), the Department of the Navy (Navy), the Department of the Air Force (Air Force), the Department of Energy (DOE); and the National Aeronautics and Space Administration (NASA).

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from NIH, the Army, the Navy, the Air Force, DOE, and NASA.

Characteristics of the Licenses Granted by Six Federal Agencies, Active as of October 1, 1998

Description	Number
Total active licenses	1,391
License type^a	
Exclusive	368
Nonexclusive	963
Other ^b	60
Licensee type	
Large business	555
Small business/individual	744
Nonprofit	40
Unknown	52
Licensees' location	
Domestic	1,177
Foreign	214

^aThe Navy's license total of 83 includes only licenses from which the Navy received royalties in fiscal years 1996, 1997, and/or 1998, except for assignments.

^bIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from NIH, the Army, the Navy, the Air Force, DOE, and NASA.

Licenses Granted by Six Federal Agencies by License Type, Fiscal Years 1996 Through 1998

Type	Funding agency						Total
	NIH	Army	Navy	Air Force	DOE	NASA	
Exclusive	87	28	17	9	3	72	216
Nonexclusive	514	19	24	10	28	39	634
Other ^a	6	0	4	6	0	0	16
Total	607	47	45	25	31	111	866

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the agencies cited.

Licenses Granted by Six Federal Agencies by License Type, Active as of October 1, 1998

Type	Funding agency						Total
	NIH	Army	Navy ^a	Air Force	DOE	NASA	
Exclusive	200	44	29	13	11	71	368
Nonexclusive	769	32	46	17	62	37	963
Other ^b	21	17	8	14	0	0	60
Total	990	93	83	44	73	108	1,391

^aThe Navy's license total includes only licenses from which the Navy received royalties in fiscal years 1996, 1997, and/or 1998, except for assignments.

^bIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the agencies cited.

Licenses Granted by Six Federal Agencies by Licensee Type, Fiscal Years 1996 Through 1998

Type	Funding agency						Total
	NIH	Army ^a	Navy	Air Force	DOE	NASA	
Large business	223	30	12	2	8	13	288
Small business/individual	346	9	30	16	23	94	518
Nonprofit	38	8	3	1	0	4	54
Unknown	0	0	0	6	0	0	6
Total	607	47	45	25	31	111	866

^aThe Army reported a licensee as a large business unless expressly identified as a small business/individual or nonprofit organization either in the license agreement or by the laboratory that entered into the agreement.

Source: GAO's presentation of data from the agencies cited.

Licenses Granted by Six Federal Agencies by Licensee Type, Active as of October 1, 1998

Type	Funding agency						Total
	NIH	Army ^a	Navy	Air Force	DOE	NASA	
Large business	438	35	32	4	29	17	555
Small business/individual	521	20	45	28	43	87	744
Nonprofit	10	8	6	12	1	3	40
Unknown	21	30	0	0	0	1	52
Total	990	93	83	44	73	108	1,391

^aThe Army reported a licensee as a large business unless expressly identified as a small business/individual or nonprofit organization either in the license agreement or by the laboratory that entered into the agreement.

Source: GAO's presentation of data from the agencies cited,

Licenses Granted by Six Federal Agencies by Licensee's Location, Fiscal Years 1996 Through 1998

Location	Funding agency						Total
	NIH	Army	Navy	Air Force	DOE	NASA	
Domestic	520	40	44	24	28	111	767
Foreign	87	7	1	1	3	0	99
Total	607	47	45	25	31	111	866

Source: GAO's presentation of data from the agencies cited.

Licenses Granted by Six Federal Agencies by Licensee's Location, Active as of October 1, 1998

Location	Funding agency						Total
	NIH	Army	Navy	Air Force	DOE	NASA	
Domestic	792	86	80	43	69	107	1,177
Foreign	198	7	3	1	4	1	214
Total	990	93	83	44	73	108	1,391

Source: GAO's presentation of data from the agencies cited.

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Characteristics of the Licenses Granted by the National Institutes of Health, Active as of October 1, 1998

Description	Number
Total active licenses	990
License type	
Exclusive	200
Nonexclusive	769
Other ^a	21
Licensee type	
Large business	438
Small business/individual	521
Nonprofit	10
Other	21
Licensees' location	
Domestic	792
Foreign	198

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from NIH.

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Characteristics of the Licenses Granted by the Department of the Army, Active as of October 1, 1998

Description	Number
Total active licenses	93
License type	
Exclusive	44
Nonexclusive	32
Other ^a	17
Licensee type^b	
Large business	35
Small business/individual	20
Nonprofit	8
Unknown	30
Licensees' location	
Domestic	86
Foreign	7

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

^bThe Army reported licensee type if so identified in the license agreement or by the laboratory that entered into the agreement; otherwise, the type was reported as "unknown."

Source: GAO's presentation of data from the Army.

Characteristics of the Licenses Granted and the Royalties Received by the Department of the Navy, Fiscal Years 1996 Through 1998

Description	1996	1997	1998	Total
Total licenses granted	16	14	15	45
License type				
Exclusive ^a	6	6	5	17
Nonexclusive	10	5	9	24
Other ^b	0	3	1	4
Licensee type				
Large business	3	4	5	12
Small business/ individual	12	10	8	30
Nonprofit	1	0	2	3
Licensees' location				
Domestic	15	14	15	44
Foreign	1	0	0	1
Total royalties received	\$369,249	\$477,970	\$917,787	\$1,765,006

^aIncludes agency responses "co-exclusive," "partially exclusive," and "assignment."

^bIncludes agency responses "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the Navy.

Characteristics of the Licenses Granted by the Department of the Navy, Active as of October 1, 1998

Description	Number
Total active licenses^a	83
License type	
Exclusive ^b	29
Nonexclusive	46
Other ^c	8
Licensee type	
Large business	32
Small business/individual	45
Nonprofit	6
Licensees' location	
Domestic	80
Foreign	3

^aThe Navy's license total includes only licenses from which the Navy received royalties in fiscal years 1996, 1997, and/or 1998, except for assignments.

^bIncludes agency responses "co-exclusive" and "partially exclusive."

^cIncludes agency responses "assignment," and "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the Navy.

Characteristics of the Licenses Granted and the Royalties Received by the Department of the Air Force, Fiscal Years 1996 Through 1998

Description	Fiscal year			Total
	1996	1997	1998	
Total licenses granted	13	5	7	25
License type				
Exclusive	4	3	2	9
Nonexclusive	3	2	5	10
Other ^a	6	0	0	6
Licensee type				
Large business	0	1	1	2
Small business/ individual	7	4	5	16
Nonprofit	0	0	1	1
Unknown	6	0	0	6
Licensees' location				
Domestic	12	5	7	24
Foreign	1	0	0	1
Total royalties received	\$158,000	\$190,000	\$212,000	\$560,000

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the Air Force.

Characteristics of the Licenses Granted by the Department of the Air Force, Active as of October 1, 1998

Description	Number
Total active licenses	44
License type	
Exclusive	13
Nonexclusive	17
Other ^a	14
Licensee type	
Large business	4
Small business/individual	28
Nonprofit	12
Licensees' location	
Domestic	43
Foreign	1

^aIncludes agency responses "co-exclusive," "partially exclusive," "assignment," or "combination exclusive and nonexclusive."

Source: GAO's presentation of data from the Air Force.

Characteristics of the Licenses Granted and the Royalties Received by the Department of Energy, Fiscal Years 1996 Through 1998

Description	Fiscal year			Total
	1996	1997	1998	
Total licenses granted	12	10	9	31
License type				
Exclusive	1	0	2	3
Nonexclusive	11	10	7	28
Licensee type				
Large business	3	3	2	8
Small business/ individual	9	7	7	23
Nonprofit	0	0	0	0
Licensees' location				
Domestic	9	10	9	28
Total royalties received	\$111,460	\$128,446	\$195,269	\$435,175

Note: A majority of the licensing activities resulting from DOE-sponsored research is conducted by its contractor-operated laboratories. These were not included in this study.

Source: GAO's presentation of data from DOE.

Characteristics of the Licenses Granted by the Department of Energy, Active as of October 1, 1998

Description	Number
Total active licenses	73
License type	
Exclusive	11
Nonexclusive	62
Licensee type	
Large business	29
Small business/individual	43
Nonprofit	1
Licensees' location	
Domestic	69
Foreign	4

Note: A majority of the licensing activities resulting from DOE-sponsored research is conducted by its contractor-operated laboratories. These were not included in this study.

Source: GAO's presentation of data from DOE.

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Characteristics of the Licenses Granted by the National Aeronautics and Space Administration, Active of as October 1, 1998

Description	Number
Total active licenses	108
License type	
Exclusive	71
Nonexclusive	37
Licensee type	
Large business	17
Small business/individual	87
Nonprofit	3
Unknown	1
Licensees' location	
Domestic	107
Foreign	1

Source: GAO's presentation of data from NASA.

Major Contacts and Staff Acknowledgements

GAO Contacts

Susan Kladiva (202) 512-3841
John P. Hunt, Jr. (404) 679-1822
Frankie Fulton (404) 679-1805

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